Office Copy

Task 220: Exploratory Site Investigation

105 Essex Road
Westbrook, Connecticut

ConnDOT Assignment No. 401-2545
ConnDOT Project No. 310-007

GEI Consultants, Inc.

188 Norwich Avenue
Colchester, CT 06415
(860) 537-0751

SUBMITTED TO

State of Connecticut
Department of Transportation
Division of Environmental Compliance
P.O. Box 317546 • 2800 Berlin Turnpike
Newington, CT 06131-7456

May 3, 2002
Project #020900-220

Table of Contents

Table of Contents (continued)

Tables

Figures

Appendices

J:\WPROC\BLG\CONNDOT\Westbrook\105 Essex\105 Essex 220.doc[JLS2]

Executive Summary

GEI Consultants, Inc. (GEI) was retained by the Connecticut Department of Transportation (ConnDOT) to conduct an Exploratory Site Investigation (ESI), at a formerly residential property located at 105 Essex Road in Westbrook, Connecticut. The scope of the work included a review of local, state, and governmental environmental agency files and databases, historic maps and documents, aerial photographs, and a site inspection.

The subject property is a half-acre former residential parcel on the west side of Essex Road (rt. 153) at the south end of the Amtrak railroad bridge, one-quarter mile north of the town center. The property is flanked northerly by the railroad corridor and westerly and southerly by other land of the Town of Westbrook, occupied by the Department of Public Works (DPW) maintenance facility.

A two-story wood framed house was constructed on the original property circa 1860. The larger property, including the land currently occupied by the DPW facility, was owned by the New York, New Haven, and Hartford Railroad Company for approximately 50 years before the subject property was reconfigured and sold off as a private residence in 1946.

The property subsequently went through a number of private ownerships. The house suffered a fire in February 2001 and was subsequently demolished and cleared from the site. The property was acquired by the Town of Westbrook in January of this year.

Conclusions

- The area surrounding the former house location contains elevated concentrations of total and leachable lead. This compound was apparently introduced from house paint or other former residential impacts.

- The former house utilized oil a heating oil storage tank and a septic tank. It appears that these items were removed during demolition; no evidence of negative impacts from their former use was found.

- Soils in the vicinity of the former roadside sheds at the southerly property corner contain elevated PAH concentrations; these compounds are apparently related to the staining and small debris observed in surficial soils at this location.

Recommendations

In the event that ConnDOT determines to acquire the subject property for proposed railroad construction, GEI recommends that a Task 320: Remedial Management Plan be prepared to

address the excavation, handling, storage, and proper disposal of contaminated materials, in order to safeguard the health of construction workers, residents and passersby, and the local environment.

1. Introduction

The Connecticut Department of Transportation (ConnDOT) retained GEI Consultants, Inc. (GEI) to perform a Task 220, Exploratory Site Investigation (ESI), at a former residential property located at 105 Essex Road in Westbrook, Connecticut. The subject property location is depicted in Figure 1. ConnDOT has proposed a total take of the subject property for proposed improvements to the Westbrook Railroad Station (ConnDOT Project No. 310-0007E).

The purpose of the Task 220 was to perform an investigation of the subject property, to assess the presence of on-site contamination, and to evaluate whether proposed construction activities may include management of contaminated soil and dewatering liquids. This investigation consists of surface-soil, subsurface soil and groundwater sampling and analysis. The investigation program is described in Section 4.0.

GEI previously conducted a Task 120, Preliminary Site Evaluation (April, 2002) for the subject site, which can be referenced for complete site information; summary information is presented herein.

The environmental concerns at this site are primarily related to potential impacts from prior use of the property for railroad maintenance operations and potential impacts related to the former heating oil storage and septic tanks from the former residential use of the property. This task was conducted in accordance with the Task 220, Exploratory Site Investigation Work Plan.

This document provides a brief description and history of the subject site (Section 2.0); the field investigation methods and rationale (Section 3.0); laboratory analytical results and evaluation of data (Section 4.0); a discussion of the local environment and receptors (Section 5.0); and the summary and conclusions (Section 6.0).

Dimensions are given in metric units, with the standard equivalents in parentheses. Exceptions are made where specific standard units are part of the historical or regulatory record (for instance, underground storage tank [UST] volumes, building dimensions), or are industry-standard specifications (e.g., well-screen length). A chart of equivalent units is provided as Appendix A.

2. Site Description and History

The Westbrook Tax Assessor's designation for the subject site is Map 37, Lot W7. The parcel consists of 0.46 acre of land, located at the southwesterly corner of the Essex Road bridge over the Amtrak railroad corridor. The property is currently vacant, but was previously occupied for approximately 140 years by a wood-framed residence. The subject property has been owned by the Town of Westbrook since January 16, 2002.

A review of land records was conducted to determine previous site ownership and land usage. Westbrook land records indicate that the property has previously been owned by the following entities and individuals:

- Liberty Investors, LLC (8/29/2001 to 1/16/2002)
- Myrna Lorraine Zubee (3/27/1985 to 8/29/2001)
- William Benjamin Zubee (6/19/1957 to 3/27/1985)
- Ernest and Margaret Mosca (5/24/1954 to 6/19/1957)
- Howard E. and Genevieve L. Pendleton (5/27/1947 to 5/24/1954)
- The New York, New Haven & Hartford Railroad Company (8/5/1905 to 5/27/1947)
- Heirs of W.G. Spencer (to 8/5/1905)

3. Local Environment

3.1 Groundwater

Groundwater below and near the site is classified GA by the Connecticut Department of Environmental Protection (CTDEP) (Reference 1). The GA classification indicates groundwater within the area of influence of private and potential public water supply wells that is presumed suitable for direct human consumption without need for treatment. The state's goal is to maintain the quality of the drinking water.

3.2 Surface Water

The westerly boundary of the adjacent DPW property is the Patchogue River, a tidal stream that ebbs and flows with considerable current and force. The westerly side of the subject property is located approximately 500 feet east of the railroad river crossing. Westbrook flood insurance rate map 090070-0006D indicates that the subject property is located in an area of minimal flooding.

The Patchogue River is classified by the CTDEP as SB/SA, designating the waters for use as a marine fish, shellfish, and wildlife habitat, shellfish harvesting, for direct human consumption, recreation, and all other legitimate uses, including navigation (Reference 1). The SB/SA classification indicates that the water does not meet water quality criteria for one or more designated uses. The state's goal is Class SA.

3.3 Water Supply

Potable water is supplied to the site by the Connecticut-American Water Company, Guilford-Chester Division (Reference 2). It is possible that privately owned residential water supply wells may still be in use in the site vicinity. No public water supply wells or surface water sources are located within 1.6 kilometers (1.0 mile) of the site (Reference 3).

3.4 Bedrock Geology

According to the United States Geological Survey (USGS) bedrock geology mapping, bedrock geology underlying the subject property is listed as the Brimfield Formation of biotite schist. An intrusion of amphibiolite and calc-silicate gneiss is identified beneath the easterly margins of the site.

3.5 Surficial Geology

According to the USGS surficial geology mapping, the subject property is underlain by a glacial end moraine, elongated northeast and southwest. The moraine consists of till and stratified drift – sand, gravel, cobbles, and crushed rock.

Site-specific geology and hydrology are provided in Sections 5.0 and 6.0 of this report.

4. Areas of Potential Environmental Concern

4.1 Objective

The objective of this investigation was to conduct a subsurface investigation (220) to assess the presence of contamination within the proposed construction areas. This investigation did not assess the potential for contaminant sources outside the construction area. To investigate these sources, surface soil, subsurface soil, and groundwater sampling and analysis was conducted. The field aspects of this investigation were conducted on April 22 and 23, 2002 by Douglas Bonoff of GEI.

The environmental concerns addressed by this investigation include:

- Potential impacts related to railroad maintenance operations which were formerly conducted on the property.
- Potential impacts related to heating oil and septic tanks related to the former residential use of the property.
- Other potential impacts caused by long-term residential occupancy.

4.2 Sampling Plan and Rationale

This subsection provides an overview of the site sampling plan, including the rationale for sampling locations and individual sample selection for laboratory analysis. Sample locations are shown in Figure 2. Sample locations were surveyed relative to site features and existing boundary monumentation. Elevation benchmarks were established relative to NAVD 88, transferred from nearby Connecticut Geodetic Survey Monument C37. The rationale for the placement of sample locations is summarized in Table 1.

4.3 Field Investigation and Sampling Methods

4.3.1 Subsurface Soil Sampling

The drilling subcontractor, Earth Technology, LLC, completed the work on April 22 and 23, 2002. GEI personnel were on site to monitor the test boring and well installation activities.

4.3.1.1 Geoprobe™ Sampling

Subsurface-soil samples were collected using a truck-mounted, direct-push (Geoprobe™) drilling rig. Samples were collected continuously from the ground surface to the final depth of each boring using a 4-foot long, approximately 2-inch diameter, stainless-steel, macrocore sampling tube. At sampling locations that were overlain by pavement, sampling began immediately beneath the pavement and any underlying gravels. Soil samples were collected by driving the macrocore sampling tube equipped with a dedicated acetate liner into the soil. The recovered soils from each successive 4-foot interval were inspected, screened with the OVA meter, and logged for geological and contaminant characteristics, after which individual samples were collected for laboratory analysis.

Geoprobe sampling began near the westerly corner of the subject property, where SB-1 was advanced with the intention of screening materials at the downgradient margin of the property and determining the general depth to the water table. Soils at this location consisted of tan/brown to orange/brown fine sand with silt and small gravel; no stains, odors or OVA response were noted. Shallow soils at this location were characterized by sample SB-1 (1'-3'). The boring continued through the apparent water table to refusal at 8± meters (26± feet) below surface grade. Sample SB-1 (22'-24') was collected to characterize materials at the apparent water table.

Geoprobe borings SB-2 and SB-3 were advanced in front of the former house location, in order to determine if the septic tank was still in the ground and what impacts might have been caused by its former usage. The borings met refusal at approximately 4.3 meters (14 feet) and 4.9 meters (16 feet), respectively, below surface grade. The soils consisted of fine-to-coarse tan/brown to orange/brown sand, small gravel, and crushed stone; no stains, odors, OVA responses, or other contaminant indicators were noted in any of these materials. The septic tank was apparently removed when the former house was demolished.

4.3.1.2 Hand Auger Sampling

Having been excavated and backfilled during the house demolition, soils at the center and rear of the property were loose and uncompacted; these areas were deemed inaccessible to the truck-mounted Geoprobe rig. Soil borings 15 through 18, located around the sides and rear of the property, were subsequently advanced by stainless steel hand auger to an average depth of 0.6 meters (2.0 feet) below surface grade.

SB-15 and SB-16 were situated at the rear of the former house and along the railroad corridor at the northwesterly property corner; no stains, odors, or other contaminant indicators were noted in these soils. One sample was composited at each location to characterize the range of shallow materials encountered.

SB-17 and SB-18 were located in areas of surficial staining near the northeasterly and southeasterly property corners, respectively. Only slight impacts were observed at SB-17, but extensive staining and foreign materials (wood, metal, plastic) were noted in soils in the vicinity of the former roadside vendor sheds. Samples were also composited to characterize the range of materials encountered.

4.3.1.3 Soil Sample Selection

The recovered soils were visually examined and logged in the field by GEI personnel. Each soil sample was screened for total volatile organic compounds (VOCs) using an organic vapor analyzer. Soil samples were selected for laboratory analysis based on visual evidence of contamination, OVA screening results, any odors observed, the water table interface, and observed geologic features that may affect the migration of contaminants. If soils from a particular sampling location did not exhibit any evidence of contamination, then the sample corresponding with the water table interface or from a depth consistent with the proposed construction activity was typically submitted for analysis. In general, the attempt was made to provide samples that would characterize the full depth range of on-site materials.

4.3.1.4 Decontamination Procedure

To prevent cross contamination between sampling rounds, the split-spoons and other sampling tools used as indicated in subsequent sections of this report were decontaminated in accordance with GEI Standard Operating Procedures (SOPs). Soil samples were collected in accordance with GEI SOPs.

4.3.2 Groundwater Sampling Methods

A temporary groundwater monitoring well was constructed at SB-1, the only on-site boring that was able to be advanced below the water table. The well was completed with approximately 5 feet of 1-inch inner diameter (I.D.) Schedule 10 PVC screen with a 0.010-inch slot width; the top of the screen was installed approximately 2 feet above the encountered water table. 1-inch I.D. PVC riser pipe was used to complete the well to the surface. The annulus surrounding the screened interval was packed with sand and topped with a bentonite clay seal. The remainder of the borehole was backfilled with native material, and the well was completed with a protective steel cover grouted flush to the ground.

Groundwater purging and sampling was performed on April 24, 2002, with a peristaltic pump and dedicated vinyl tubing. Prior to sampling, the depths to groundwater were measured and minimum purge volumes calculated. The overburden at SB/MW-1 proved to be fairly permeable, and produced a steady flow of groundwater. The well was slow-purged of 4± gallons prior to sampling. After clearing the initial turbidity out of the well screen,

groundwater flowed clearly. No sheens, discolorations, or odors were noted on the purgewater or sample volumes.

A groundwater sample was collected for analysis of VOCs, SVOCs, total RCRA 8 metals, and TPH. The VOC sample containers were pre-preserved with hydrochloric acid, and the sample collected for metals analysis was field preserved with nitric acid. The metals sample was not filtered so that the sample would simulate groundwater quality for potential construction dewatering activities.

4.4 Laboratory Analysis

All soil and groundwater samples collected for analysis were placed into an ice cooler immediately after collection. Copies of the original chain-of-custody forms are included in Appendix C.

The samples were analyzed by Spectrum Analytical, Inc. of Agawam, Massachusetts, as specified in Table 1. VOCs and SVOCs were selected for analysis because they comprise chemicals contained in solvents, degreasers, and petroleum products, all of which are commonly associated with areas of potential chemical releases. The metals selected for analysis (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) have been identified by the United States Environmental Protection Agency (EPA) as common metal contaminants. Polychlorinated biphenyls (PCBs) were selected for analysis because of unknown characteristics of on-site fill and/or their association with transformer fluids, hydraulic fluids, and waste oils. Total petroleum hydrocarbon (TPH) analysis was conducted because it can provide a general indication of petroleum-related impacts.

5. Geology

Surficial materials on site consist of stratified drift – well-sorted sand and gravel – deposited from glacial outwash. Bedrock outcrops are visible on the east side of the subject property and to the south on the opposite side of Norris Avenue. Bedrock was not conclusively encountered in any of the borings, but SB-1 met refusal on very dense sand and crushed rock at 8± meters (26± feet) below surface grade. This material resembles glacial till, generally found directly above the bedrock surface. The depth of overburden apparently increases westerly with greater proximity to the Patchogue River drainage.

6. Hydrology

6.1 Groundwater Flow Direction

The flow direction of groundwater is controlled mainly by topography. However, flow is also influenced by aquifer type, depth to bedrock, watercourses near the site, groundwater use, and subsurface structures. Generally, groundwater flows from topographic high points to low points. Based on the limited number of monitoring wells (one on-site well and three wells on the westerly adjacent property), the topography of the site and vicinity, and the other controlling factors indicated, local groundwater flow is inferred to be westerly and northwesterly toward the Patchogue River. The high water line on the river bank has an elevation of approximately 2.20 feet; the groundwater elevation at MW-1 was determined to be 4.28 feet. The average groundwater gradient across the site is relatively shallow at approximately 1/240 or 0.4%.

Groundwater Elevation Data

Monitoring Well ID	Date	Time	MP* Elevation	Depth to Groundwater	Groundwater Elevation
MW-1	4-24-02	0900	25.35	21.07	4.28
MW-4	4-24-02	0900	22.66	20.15	2.51
MW-5	4-24-02	0900	24.44	20.34	4.10
MW-6	4-24-02	0900	22.66	18.97	3.69

* Measuring point consisted of top of PVC riser for all wells. Elevations are relative to NAD 83.

7. Laboratory Analytical Results

7.1 CTDEP Cleanup Criteria

7.1.1 Overview and Applicability

Analytical results for soil and groundwater samples obtained during this investigation were compared to the Connecticut Remediation Standard Regulations (RSRs) (January 1996) developed by the CTDEP. The cleanup standards are summarized herein, but the actual referenced document should be consulted for complete details.

The CTDEP's intent in developing these regulations is to define: minimum remediation performance standards, specific numeric cleanup criteria, and a process for establishing an alternative site-specific standard.

The regulations apply at any action taken to remediate polluted soil, surface water, or a groundwater plume at or emanating from a release area, provided that the remedial action is: (1) required pursuant to Chapter 445 (Hazardous Waste) or 446K (Water Pollution Control) of the Connecticut General Statutes; or (2) undertaken pursuant to the voluntary cleanup provisions of Public Act 95-183 or 95-190; including, but not limited to, any such action required to be taken or verified by a licensed environmental professional, except as otherwise provided in the regulations. Specifically, the regulations provide that the standards do not apply to: (1) the soil and water within the zone of influence of a groundwater discharge permitted under Section 22a-430 CGS; or (2) a release which has been remediated and which remediation has been approved in writing by the CTDEP.

7.1.2 Soil Cleanup Criteria

The CTDEP soil remediation goals integrate two soil cleanup criteria: (1) Direct Exposure Criteria (DEC) to protect human health and the environment from risks associated with direct exposure to pollutants in contaminated soil; and (2) Pollutant Mobility Criteria (PMC) to protect groundwater quality from pollutants that migrate from the soil to groundwater. Soils to which both criteria apply must be remediated to a level which is equal to the more stringent criteria. The CTDEP cleanup criteria also include a requirement that contaminated soils which pose an ecological risk be remediated on a case-by-case basis.

Direct Exposure Criteria (DEC). Specific numeric exposure criteria for a broad range of pollutants in soil have been established by CTDEP, based on exposure assumptions relative to incidental ingestion of pollutants in soils and dermal contact with soils. The DEC apply to accessible soil to a depth of 15 feet. The DEC for substances other than PCBs do not apply to inaccessible soil at a release area provided that an environmental land-use restriction (ELUR) is in effect with respect to the subject parcel. Refer to the cleanup regulations for specific requirements regarding PCB-contaminated soil. Inaccessible soil generally means

polluted soil which is: (1) more than 4 feet below the ground surface; (2) more than 2 feet below a paved surface comprised of a minimum of 3 inches of bituminous concrete or concrete; (3) beneath an existing building; or (4) beneath another permanent structure(s) approved by the Commissioner. Inaccessible soil cannot be exposed by excavation, demolition, or construction activities without written approval from the Commissioner.

CTDEP has established two sets of DEC using exposure assumptions appropriate for residential land use or for industrial and certain commercial land use. In general, all sites are required to be cleaned up to the residential criteria. An industrial/commercial site (in lieu of meeting the residential standards) may meet the industrial land-use criteria, if an ELUR is in effect with respect to such parcel.

Pollutant Mobility Criteria (PMC). The PMC that will apply to remediation of a site depend on the groundwater classification of the site. The purpose of these criteria is to prevent any contamination to groundwater in GA-classified areas, and to prevent unacceptable further degradation to groundwater in GB-classified areas. The PMC generally apply to all soil in the unsaturated zone, from the ground surface to the seasonal low water table in GA-classified areas. For sites within GB-classified areas, the PMC are applicable to all soils from the ground surface to the seasonal high water table. The PMC or an appropriate alternative criteria may also be applied to soils below the water table if such soils constitute an ongoing source of groundwater pollution and if remediation of such soils is technically practicable. The criteria do not apply to environmentally isolated soils that are polluted with substances other than VOCs provided that an ELUR is recorded for the site which ensures that such soils will not be exposed as a result of demolition of the building or other activities. Environmentally isolated soils are defined as contaminated soils beneath an existing building (or other permanent structure, as approved by the Commissioner) which are not a source of ongoing pollution. "Urban fill" material (coal or wood ash, or asphalt fragments) may also be exempt from the PMC in certain cases.

A substance, other than an inorganic substance or PCB, in soil shall be remediated to at least that concentration at which the results of a mass analysis of soil for such substance does not exceed the PMC applicable to the groundwater classification (e.g., GA/GAA) of the area in which the soil is located. An inorganic substance or PCB in soil shall be remediated to at least that concentration in which the results of a toxicity characteristic leaching procedure (TCLP) or synthetic precipitation leaching procedure (SPLP) analysis of such soil for such substance does not exceed the PMC applicable to the groundwater classification of the area in which the soil is located. If certain conditions are met, a site in a GA area need only be remediated to GB standards.

7.1.3 Groundwater Remediation Standards

Similar to remediation standards for soil, groundwater remediation requirements are dependent upon the groundwater classification. The objectives of these standards are to: (1) protect and preserve groundwater in GA areas as a natural resource; (2) protect existing use of groundwater regardless of the area's groundwater classification; (3) prevent further

degradation of groundwater quality; (4) prevent degradation of surface water from discharges of contaminated groundwater; and (5) protect human health.

The Groundwater Remediation Standards regulate remediation of groundwater based on each substance present in a plume and by each distinct plume of contamination. Several factors influence the remediation goal at a site, including: background groundwater quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and existing buildings and their use. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the major numeric components of the RSRs.

The three major numeric components, which are described herein, include the following.

- Groundwater Protection Criteria (GWPC)
- Surface Water Protection Criteria (SWPC)
- Volatilization Criteria (VC)

Groundwater Protection Criteria. The GWPC apply to all groundwater in a GA-classified area. The GWPC ensure that groundwater contamination resulting from on-site sources which exceeds background is remediated to levels that adequately protect its designated use as an existing or potential supply of water suitable for drinking without treatment. In general, compliance with GWPC is achieved when the concentration of all substances in a plume is less than the GWPC.

Surface Water Protection Criteria. The SWPC apply to all groundwater which discharges to surface water. The SWPC ensure that groundwater contamination resulting from on-site sources which exceeds background is remediated to levels that adequately protect the surface water quality. SWPC are based on Connecticut's water quality standards which are protective of both human health and the environment. In general, compliance with the SWPC is achieved when the average concentration of a compound in groundwater emanating from a site is less than the SWPC established by the CTDEP.

Volatilization Criteria. The VC apply to all groundwater polluted with a volatile organic substance within 15 feet of the ground surface or a building. According to the regulations, the volatile organic substance of concern will be remediated to a concentration which is equal to or less than the applicable residential VC for groundwater. If groundwater polluted with a volatile organic substance is below a building used solely for industrial or commercial activity, groundwater may be remediated to the applicable industrial/commercial VC in lieu of the residential VC for groundwater, provided that an ELUR is in effect with respect to the parcel (or portion of the parcel covered by the building). The ELUR also must ensure that the parcel (or portion thereof beneath the building) will not be used for any residential purpose in the future and that any future use is limited to industrial or commercial activity. There are a number of exceptions to the VC under the RSRs.

In GA-classified areas, the remediation goal is generally the background concentration and compliance with the SWPC and VC. Background concentration for a compound in

groundwater at a site is defined as the concentration of that compound in groundwater (immediately upgradient of the contamination plume) that is not affected by any release of pollutants on or related to the site.
Groundwater in a GA area can be remediated to the numerical GWPC, rather than background, under one of two scenarios, as follows.

- When the following conditions are met.
  - Groundwater background concentration is less than or equal to the GWPC.
  - A public water supply system is available within 200 feet of the site.
  - The site is not located within an aquifer protection area.
  - The site is not located within an area of influence associated with a public water supply well.

Or:

- If prior to remediation, the maximum concentration in the plume is less than or equal to the GWPC.

7.2 Evaluation of Data

7.2.1 Soil Sample Analytical Results

No VOCs or PCBs were detected in any on-site sample. Extractable TPH was detected in three of the four perimeter soil samples, but at concentrations below the RDEC and GA PMC.

PAHs were detected in SB-18 (0'-2') at levels exceeding the RDEC; two compound concentrations also exceeded the IDEC. PAHs were also detected below RSR criteria in the shallow soils at SB-1, SB-15, and SB-17. At 480 mg/kg, the ETPH concentration at this location was slightly below the RDEC.

The total lead concentration at SB-15 slightly exceeded the RDEC for that compound; likewise the SPLP lead concentration exceeded the GA PMC. The latter criterion was also exceeded in the shallow soil at SB-2.

The analytical data is presented in Table 2, and the sampling locations are shown on Figure 3. The full laboratory report is provided as Appendix C.

7.2.2 Groundwater Analytical Results

The onsite groundwater sample (MW-1) was visually clear and free of observable odor or discoloration.

No VOCs, SVOCs, or TPH was detected in the sample. Barium was detected well below the GA GPC, but no other metals were found. The presence of barium is consistent with background soil conditions in the site vicinity.

The groundwater analytical data is presented in Table 3, and the monitoring well locations are depicted on Figure 3. The full laboratory report is included as Appendix C.

7.2.3 Quality Assurance/Quality Control (QA/QC)

A duplicate soil sample was collected for QA/QC purposes on the adjacent DPW property; SB-13 (1'-4') was a duplicate of SB-12 (1'-4'). The duplicate sample was analyzed for all of the same parameters as the parent sample.

The analytical results of the parent and duplicate soil samples matched very closely, comparing analyte-by-analyte to a 15±% spread of PAH and ETPH concentrations. The single statistical comparison is considered adequate to confirm the analytical reliability of the laboratory data.

8. Receptors

The following is a summary of affected environmental media and associated potential receptors.

8.1 Groundwater and Soils

Receptors of contaminated soils could include construction workers via direct exposure and area residents via exposure to windblown particles from the construction activities. Contaminated soil and groundwater could also migrate to surface waters. It is not anticipated that any nearby privately owned water supply wells could be impacted by on-site activities.

8.2 Surface Water

The Patchogue River is a tidal stream that ebbs and flows with considerable volume and velocity along the westerly margins of the westerly adjacent property, occupied by the DPW facility. The back of the active DPW yard is subsurficially capped with concrete; the grout slurry extends over the historic fill material at the west end of the property and effectively prevents further erosion or slumping of the top of bank.

The property boundaries extend across a thick shoreline band of fragmites and estuarine grasses, and the high water line of the Patchogue River is defined by an enmeshed fringe of plastic debris and rotten vegetation. A well-anchored and intact silt fence is in place at the bottom of the bank. It is not anticipated that any current or proposed on-site activities could negatively impact the quality of this surface water.

9. Conclusions and Recommendations

9.1 Conclusions

- Shallow soils at the former location of the roadside sheds contain elevated PAH concentrations. The presence of these compounds, along with a near-exceedance of the TPH criteria, indicate that a fuel or chemical spill may have occurred at this location. Alternatively, the compound concentrations may be caused by roadway contaminants carried by stormwater running off the pavement.

- Slightly elevated lead concentrations in front of and behind the former house location indicate that this condition may be representative of the general area.

- No groundwater impacts were observed on site.

9.2 Recommendations

In the event that ConnDOT proceeds with the acquisition of this property for proposed railroad station construction, GEI recommends that a Task 320: Remedial Management Plan be developed and implemented to ensure that any contaminated materials encountered during proposed construction activities are properly handled, stored, and disposed, in order to protect the health of construction workers, nearby residents and passersby, and the local environment.

10. Limitations

The investigation described in this report and this report were conducted and prepared on behalf of and for the exclusive use of ConnDOT and its counsel. No other entity may rely upon the results of the investigation or contents of this report for any reasons or purpose whatsoever.

The conclusions summarized herein were based on the limited observations and investigations described within this submittal at the time the investigation was conducted. Future events at the site or the surrounding properties may alter these findings.

In preparing this report, GEI relied on direction and certain information provided by state and local officials, and information and representations made available to GEI at the time of the assessment. To the extent that such information is incomplete or inaccurate, GEI is not responsible. To the extent that specific subsurface conditions have not been characterized or identified, GEI is not responsible.

GEI has performed this study in a professional manner using that degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The conclusions provided by GEI are based solely on the scope of work conducted, and on observations and limited explorations described within this submittal at the time these services were conducted. No other warranty, expressed or implied, is made as to the professional opinions included by GEI in this report.

References

1. *Water Quality Classification Map of Connecticut.* Connecticut Department of Environmental Protection, Bureau of Water Management, Planning and Standards Division, February 1993.

2. *Community Water Systems in Connecticut*: A 1984 Inventory. CTDEP, Natural Resources Center.

3. *Atlas of the Public Water Supply Sources and Drainage Basins of Connecticut.* June 1982, D.E.P. Bulletin No. 4, CTDEP and Natural Resources Center.

Tables

Table 1
Exploratory Site Investigation
Sampling Rationale and Analysis

ID	Location/Rationale	Sample Designations	VOCs	SVOCs	ETPH	PCBs	Total Metals	SPLP Metals	SPLP SVOCs
SB-1	Characterize soil and groundwater at downgradient property corner	SB-1 (1'-3')	●	●	●	●	●	●	*
		SB-1 (22'-24')	●	●	●	●	●	●	*
		MW-1	●	●	●	●	●		
SB-2	Characterize soil in the vicinity of former septic tank	SB-2 (0'-4')	●	●	●	●	●	●	*
SB-3	Characterize soil in the vicinity of former septic tank	SB-3 (4'-8')	●	●	●	●	●	●	*
SB-15	Characterize soil behind former house	SB-15 (0'-2')	●	●	●	●	●	●	*
SB-16	Characterize soil at property corner adjacent to railroad corridor	SB-16 (0'-2')	●	●	●	●	●	●	*
SB-17	Characterize soil at stained area near railroad corridor	SB-17 (0'-2')	●	●	●	●	●	●	*
SB-18	Characterize soil at former shed location	SB-18 (0'-2')	●	●	●	●	●	●	*

Note
* - Contingent analysis based on total mass results.

Table 2
Soil Analytical Results Summary
105 Essex Road
Westbrook, Connecticut

Analytes	RDEC	I/C DEC	GA PMC	Sample ID/Interval							
				SB-1 (1'-3')	SB-1 (22'-24')	SB-2 (0'-4')	SB-3 (4'-8')	SB-15 (0'-2')	SB-16 (0'-2')	SB-17 (0'-2')	SB-18 (0'-2')
Volatile Organic Compounds (VOCs) mg/kg (ppm)											
VOCs	---	---	---	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Semivolatile Organic Compounds (SVOCs) mg/Kg (ppm)											
Anthracene	1,000	2,500	40	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3.00
Acenaphthene	1,000	2,500	8.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.58
Acenaphthylene	1,000	2,500	8.4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.41
Benz(a)anthracene	1	7.8	1	0.33	BDL	BDL	BDL	BDL	BDL	0.26	12.00
Benzo(b)fluoranthene	1	7.8	1	0.53	BDL	BDL	BDL	BDL	BDL	0.40	15.00
Benzo(k)fluoranthene	8.4	78	1	0.25	BDL	BDL	BDL	BDL	BDL	BDL	7.50
Benzo(a)pyrene	1	1	1	0.35	BDL	BDL	BDL	BDL	BDL	BDL	12.00
Benzo(g,h,i)perylene	1,000	2,500	4.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	6.80
Chrysene	84	780	1#	0.58	BDL	BDL	BDL	0.39	BDL	0.47	13.00
Fluoranthene	1,000	2,500	5.6	0.63	BDL	BDL	BDL	0.69	BDL	0.87	29.00
Indeno(1,2,3-cd)pyrene	1#	7.8	1#	BDL	BDL	BDL	BDL	BDL	BDL	BDL	6.50
Phenanthrene	1,000	2,500	4	0.31	BDL	BDL	BDL	0.50	BDL	0.45	11.00
Pyrene	1,000	2,500	4	0.64	BDL	BDL	BDL	0.64	BDL	0.78	23.00
Dibenzofuran	270	2,500	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.24
Fluorene	1,000	2,500	5.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.70
Dibenz(a,h)anthracene	1	1	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.40
Total Resource Conservation Recovery Act (RCRA)-8 Metals (ppm)											
Arsenic	10	10	---	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium	4,700	140,000	---	31.1	42.1	156	36.2	167	42.2	58	32.4
Cadmium	34	1,000	---	0.681	BDL	1.34	BDL	1.2	BDL	0.541	BDL
Chromium, Total*	100	100	---	7.16	7.91	17.1	5.88	12.8	7.92	9.77	8.56
Lead	500	1,000	---	27.1	BDL	230	19.8	407	44.3	69.8	48.5
Selenium	340	10,000		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver	340	10,000		BDL	BDL	BDL	BDL	2.2	BDL	BDL	BDL
Mercury	20	610	---	BDL	BDL	BDL	BDL	0.311	BDL	BDL	BDL
SPLP Resource Conservation Recovery Act (RCRA)-8 Metals (mg/L)											
Arsenic	---	---	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Barium			1	BDL	BDL	BDL	BDL	0.0725	0.043	0.0418	0.0466
Cadmium			0.005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	---	---	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead			0.015	BDL	BDL	0.027	BDL	0.041	BDL	BDL	BDL
Selenium			0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Silver			0.036	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury			0.002	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Extractable Total Petroleum Hydrocarbons (ETPH) mg/Kg (ppm)											
ETPH	500	2,500	500	BDL	BDL	BDL	BDL	110	BDL	130	480
Polychlorinated Biphenyls (PCBs) mg/Kg (ppm)											
PCBs	1	10	0.0005	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Notes: Only those compounds detected are shown.

CTDEP stands for the Connecticut Department of Environmental Protection
RDEC stands for the Residential Direct Exposure Criteria
I/C DEC stands for Industrial Commercial Direct Exposure Criteria
GA PMC stands for the GA groundwater Pollutant Mobility Criteria
SPLP stands for Synthetic Precipitation Leaching Proceedure

--- Indicates CTDEP criteria is not applicable
NE Indicates CTDEP criteria is not established
ppm Indicates parts per million
BDL Indicates Below Laboratory Detection Limit
# Indicates criteria is based upon detection limits
* Indicates that no RDEC and IDEC values are established for total chromium. The CTDEP-established value for hexavalent chromium was used for comparison.

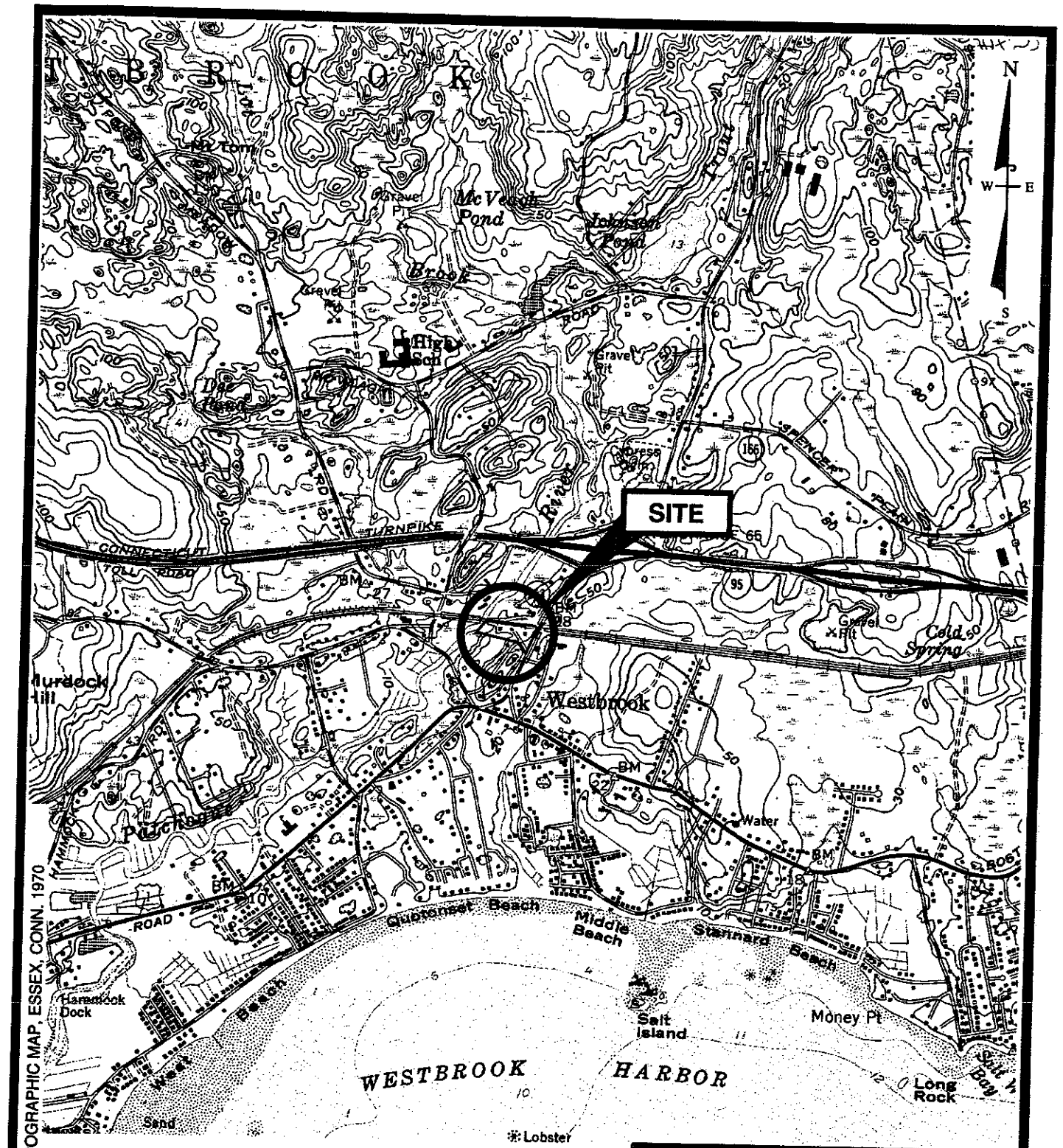
J:\WPROC\BLG\CONNDOT\Old Saybrook\OldSaybr220Table.xls

Table 3
Groundwater Analytical Results Summary
105 Essex Road
Westbrook, Connecticut

Analytes			Sample ID
	GA GWPC	SWPC	MW-1
Volatile Organic Compounds (VOCs) ug/L (ppb)			
VOC	---	---	BDL
Semivolatile Organic Compounds (SVOCs) ug/L (ppb)			
SVOC	---	---	BDL
Total Resource Conservation Recovery Act (RCRA)-8 Metals ug/L (ppb)			
Barium	1,000	NE	64.4
Extractable Total Petroleum Hydrocarbons (ETPH) ug/L (ppb)			
ETPH	500	NE	BDL

Notes: Only those compounds detected are shown.
CTDEP stands for the Connecticut Department of Environmental Protection
GA GWPC stands for the Groundwater Protection Criteria for a GA groundwater area
SWPC stands for Surface Water Protection Criteria
BDL stands for below the detection limit
NE means that CTDEP Standard is not established or applicable
ug/L means micrograms per liter
ppb means parts per billion

Figures

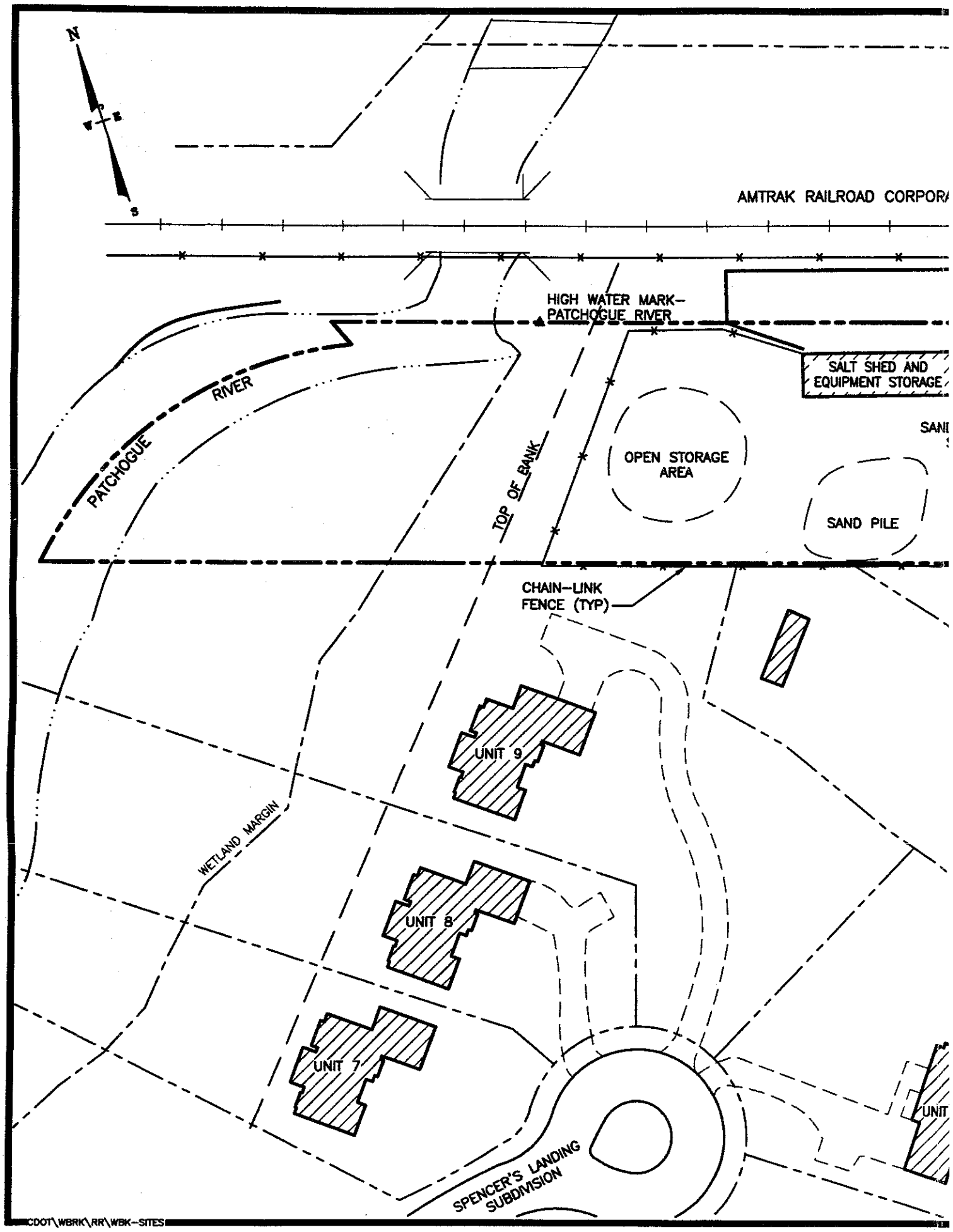


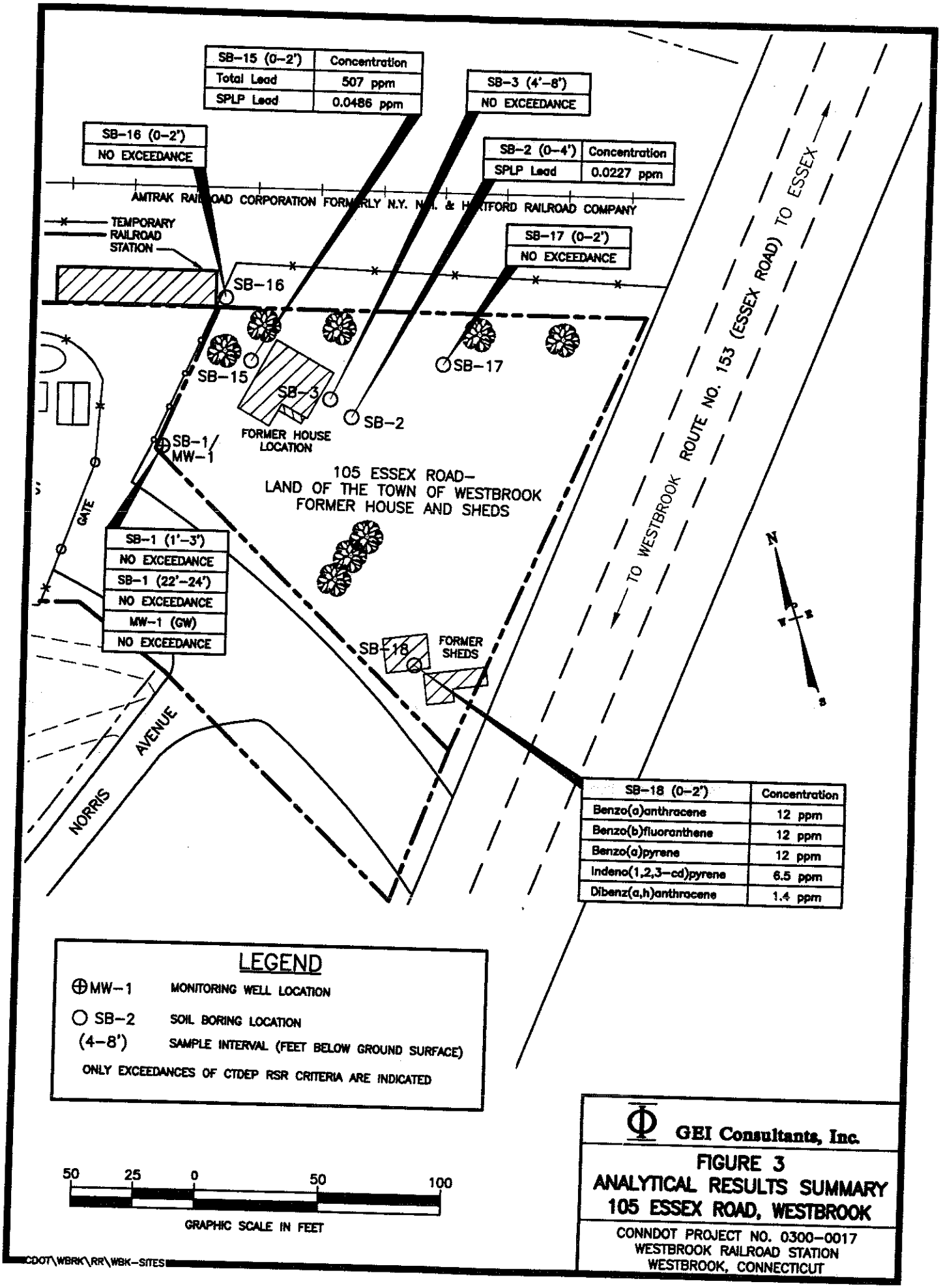
GEI Consultants, Inc.

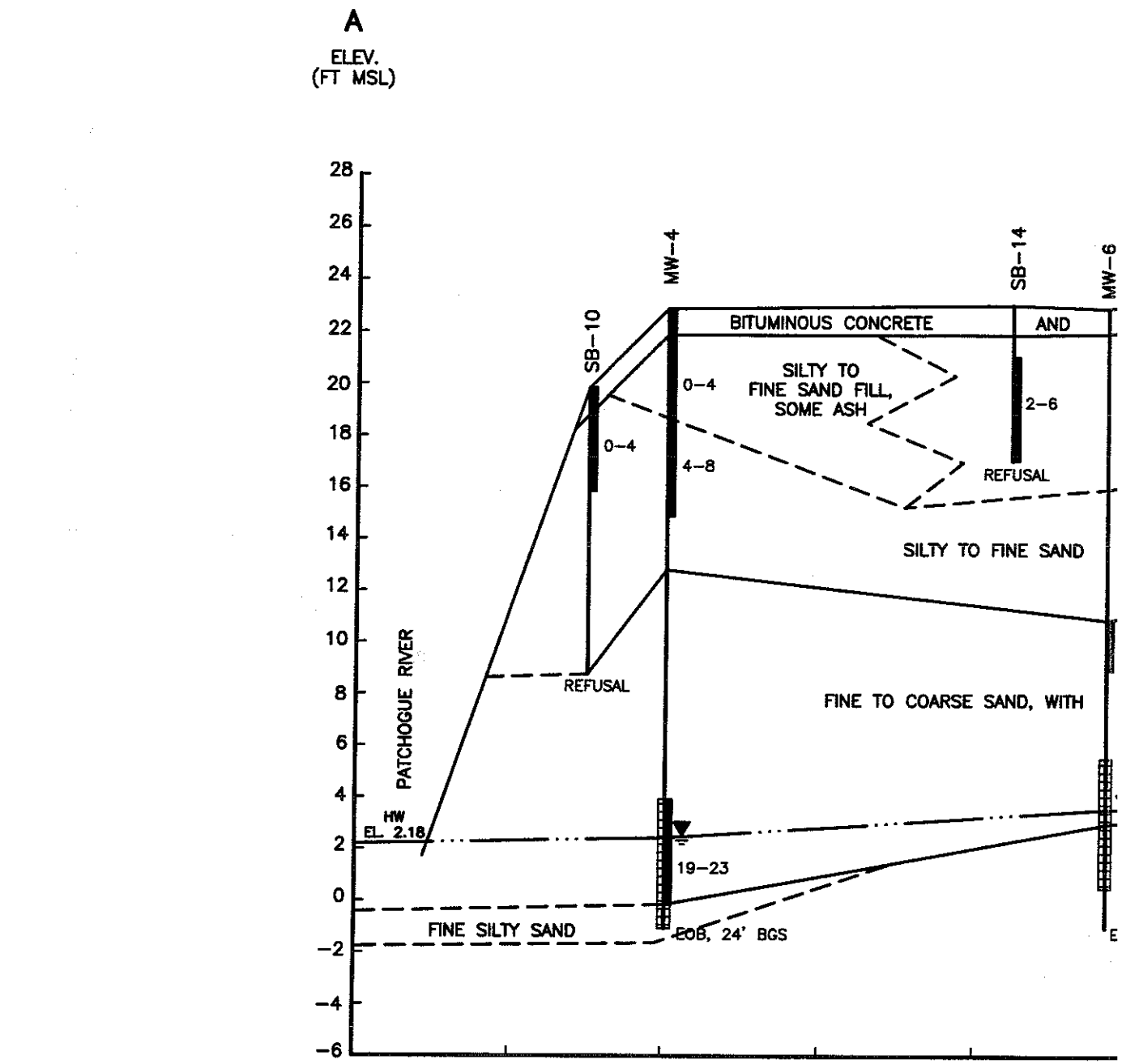
FIGURE 1
SITE LOCATION MAP
105 ESSEX ROAD, WESTBROOK

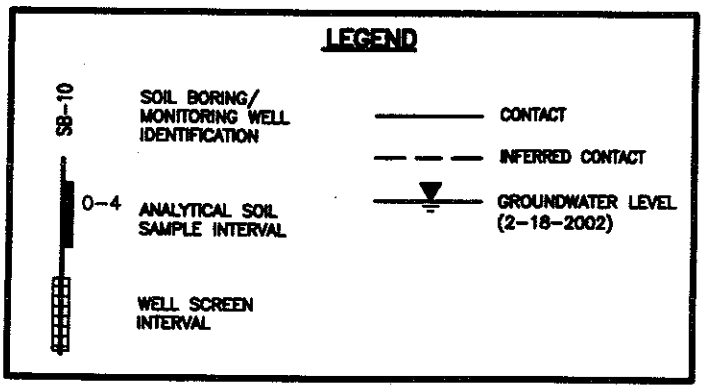
CONNDOT PROJECT NO. 0300-0017
WESTBROOK RAILROAD STATION
WESTBROOK, CONNECTICUT

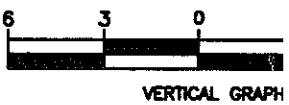
CDOT\WESTBROOK\RAILROAD\WBK-LOC.PPT

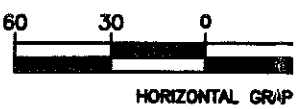

N
W
E
S
AMTRAK RAILROAD CORPORA
HIGH WATER MARK–
PATCHOGUE RIVER
SALT SHED AND
EQUIPMENT STORAGE
SANI
PATCHOGUE
RIVER
TOP OF BANK
OPEN STORAGE
AREA
SAND PILE
CHAIN–LINK
FENCE (TYP)
UNIT 9
WETLAND MARGIN
UNIT 8
UNIT 7
UNIT
SPENCER'S LANDING
SUBDIVISION
CDOT\WBRK\RR\WBK–SITES


SB-15 (0-2') | Concentration
Total Lead | 507 ppm
SPLP Lead | 0.0486 ppm
SB-3 (4'-8')
NO EXCEEDANCE
SB-16 (0-2')
NO EXCEEDANCE
SB-2 (0-4') | Concentration
SPLP Lead | 0.0227 ppm
AMTRAK RAILROAD CORPORATION FORMERLY N.Y. N.H. & HARTFORD RAILROAD COMPANY
TEMPORARY RAILROAD STATION
SB-17 (0-2')
NO EXCEEDANCE
SB-16
SB-15
SB-3
SB-2
SB-17
FORMER HOUSE LOCATION
SB-1/ MW-1
105 ESSEX ROAD-
LAND OF THE TOWN OF WESTBROOK
FORMER HOUSE AND SHEDS
GATE
SB-1 (1'-3')
NO EXCEEDANCE
SB-1 (22'-24')
NO EXCEEDANCE
MW-1 (GW)
NO EXCEEDANCE
SB-18
FORMER SHEDS
TO WESTBROOK ROUTE NO. 153 (ESSEX ROAD) TO ESSEX
NORRIS AVENUE
N
W
E
S
SB-18 (0-2') | Concentration
Benzo(a)anthracene | 12 ppm
Benzo(b)fluoranthene | 12 ppm
Benzo(a)pyrene | 12 ppm
Indeno(1,2,3-cd)pyrene | 6.5 ppm
Dibenz(a,h)anthracene | 1.4 ppm
LEGEND
⊕MW-1 MONITORING WELL LOCATION
○ SB-2 SOIL BORING LOCATION
(4-8') SAMPLE INTERVAL (FEET BELOW GROUND SURFACE)
ONLY EXCEEDANCES OF CTDEP RSR CRITERIA ARE INDICATED
50 25 0 50 100
GRAPHIC SCALE IN FEET
GEI Consultants, Inc.
FIGURE 3
ANALYTICAL RESULTS SUMMARY
105 ESSEX ROAD, WESTBROOK
CONNDOT PROJECT NO. 0300-0017
WESTBROOK RAILROAD STATION
WESTBROOK, CONNECTICUT
CDOT\WBRK\RR\WBK-SITES


A
ELEV.
(FT MSL)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
−2
−4
−6
SB−10
MW−4
SB−14
MW−6
BITUMINOUS CONCRETE
AND
SILTY TO
FINE SAND FILL,
SOME ASH
0−4
0−4
4−8
2−6
REFUSAL
SILTY TO FINE SAND
PATCHOGUE RIVER
REFUSAL
FINE TO COARSE SAND, WITH
HW
EL. 2.18
19−23
FINE SILTY SAND
EOB, 24' BGS


LEGEND
SB−10
SOIL BORING/
MONITORING WELL
IDENTIFICATION
0−4
ANALYTICAL SOIL
SAMPLE INTERVAL
WELL SCREEN
INTERVAL
CONTACT
INFERRED CONTACT
GROUNDWATER LEVEL
(2−18−2002)


6
3
0
VERTICAL GRAPH


60
30
0
HORIZONTAL GRAP

Appendix B

Boring Logs

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-1/MW-1**	**Client:**	**ConnDOT**
Project Number:	**020890**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**105 Essex Road**
Date:	**04-22-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0-1.0: Tan/brown fine sand 1.0-2.5 Brown, slightly black-stained sand and crushed rock 2.5-4.0 Light brown fine-medium sand and gravel, moist
4-8			6.0-7.0 Tan/brown fine sand with silt and crushed rock 7.0-8.0 Brown silt and fine sand, dense, moist, slightly elastic
8-12		0.0	8.0-9.0 Brown silty sand grading to fine sand and small gravel 9.0-12.0 Light brown fine sand, uniform, fairly dense, grading to orange at bottom, fairly dry
12-16			12.0-16.0 Orange/tan/light brown fine sand, uniform, predominantly orange, dense, slightly moist, no stains or odors
16-20			16.0-17.5 Orange fine sand (as above) 17.5-18.0 Brown medium sand and crushed rock
		0.0	18.0-20.0 Orange/brown fine sand and crushed rock, apparent glacial till, dense, very compact
20-24			22.0-22.5 Grey crushed rock 22.5-24.0 Grading to orange fine-medium sand and crushed rock, moisture visible
24-28			24.0-26.0 Fine-medium sand and crushed rock (till), wet 26.0 Refusal
			Completed as monitoring well Screened interval: 17-22' Sample interval: 1-3'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-2**	**Client:**	**ConnDOT**
Project Number:	**020890**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**105 Essex Road**
Date:	**04-22-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			2.5-3.5 Brown fine sand 3.5-4.0 Black coarse sand
4-8			5.0-6.0 Fine sand and crushed rock 6.0-7.5 Fine-coarse sand, cobbles and crushed rock, compact, dry 7.5-8.0 Gray/brown silt and silty fine sand
8-12			9.0-9.5 Gray/brown silt and silty fine sand 9.5-12.0 Orange fine-coarse sand, some silt and small gravel, compact, dry
12-16			12.0-13.0 Same as above 13.0-13.5 Compact sand and crushed rock grading to till or large rocks 13.5 Refusal Sample interval: 0-4'

GEI Consultants, Inc.

GEOPROBE SOIL BORING LOG

Boring ID:	**SB-3**	**Client:**	**ConnDOT**
Project Number:	**020890**	**Project Name:**	**Westbrook Railroad Station**
Logged By:	**Bonoff**	**Site Address:**	**105 Essex Road**
Date:	**04-22-02**	**Contractor:**	
Total Depth:		**Driller:**	**Earth Technology, LLC**

Depth (feet)	Recovery (inches)	PID (ppm)	Soil Description
0-4			0.0-0.4 Black/brown/grey silty sand, crushed rock at bottom
4-8			5.0-6.0 Grey crushed rock and silty sand 6.0-8.0 Orange fine-medium sand, compact, slightly moist
8-12			8.0-8.5 Orange sand (same as above) 8.5-11.0 Alternating bands of silty sand and fine sand 11.0-12.0 Tan/orange fine-medium sand, loose, fairly dry
12-16			12.0-16.0 Alternating bands of silty sand and fine sand, uniform, fairly dry 16.0 Refusal at 16.0 feet, no additional recovery, slightly moist Sample interval: 4-8'